Fact Sheet: Cache Creek, Bear Creek, and Harley Gulch, CA TMDL

WATERBODY/WATERSHED	Cache Creek and two of its tributaries, Bear Creek, and Harley Gulch, located in the Central Valley Region of California.
DATE TMDL APPROVED	*TMDL Approved*: November 2004 *TMDL Established by*: Central Valley Regional Water Quality Control Board
BASIS FOR 303(d) LISTING	Fish in Cache Creek and Bear Creek have elevated fish tissue mercury levels. Additionally, mercury water column concentrations exceed the California Toxics Rule (CTR) water quality criterion at numerous sampling sites in Cache Creek and its tributaries during storm events.
WATER QUALITY STANDARDS TARGET & TMDL TARGET	*Fish Tissue Numeric Targets*:* **Cache Creek:** 0.12 mg/kg wet weight in trophic level 3 (TL3) fish; and 0.23 mg/kg wet weight in trophic level 4 (TL4) fish.* **Bear Creek:** 0.23 mg/kg wet weight in trophic level 4 (TL4) fish **Harley Gulch:** 0.05 mg/kg wet weight for trophic level 2 and 3 fish** *numeric targets are in the form of methylmercury concentrations in trophic level 3 and 4 fish consumed by raptors and humans. **Harley Gulch has no TL4 fish. *TMDL Aqueous Methylmercury Concentration Goals**: **Cache Creek:** 0.14 ng/L annual, median aqueous (unfiltered) methylmercury needed to attain target of 0.12 mg/kg; and 0.15 ng/L annual median aqueous (unfiltered) methylmercury needed to attain target of 0.23 mg/kg. **Bear Creek**: 0.06 ng/L annual, median aqueous (unfiltered) concentration of methylmercury needed to attain target of 0.23 mg/kg. **Harley Gulch:** 0.09ng/L annual, median aqueous (unfiltered) methylmercury needed to attain target of 0.05 mg/kg. Data collected in 2000 and 2001 show statistically significant relationships between concentrations of methylmercury in water and in benthic invertebrates and between benthic invertebrates and large fish. Based on this linkage analysis, the TMDL aqueous methylmercury concentration goals represent the best estimates of the annual concentrations necessary to attain the fish tissue targets.
EXISTING SOURCE LOADINGS	*Nonpoint Sources:* inputs estimated from atmospheric deposition, tributary inputs and in-channel erosion. Inactive mercury mines are a significant contribution of the overall nonpoint source loadings in the watershed. Atmospheric deposition to Cache Creek is estimated to contribute less than 0.1 percent of the mercury loads. *Point Sources:* There are no NPDES permitted discharges to Cache Creek, Bear Creek, or Harley Gulch.

METHOD FOR CHARACTERIZING EXISTING LOADINGS	**The following methods were used to calculate constituent loadings for each tributary:** **Water and Sediment Budgets:** Mercury and sediment budgets were calculated by multiplying water volume by the concentration of each constituent. Tributary inflows, agricultural diversions and rainfall data for water years 1996 through 2000 were used to calculate a water budget for Cache Creek. **Methylmercury Budget:** Average aqueous methylmercury concentrations were used to calculate loads. The average concentrations consists of ten samples per site, multiplied by the daily flow rate and then summed over one year to calculate site-specific, annual loads. **Total Mercury Budget**: Total unfiltered mercury budgets were developed for Cache Creek, Bear Creek and Harley Gulch. The total mercury budgets are coupled in the next section with sediment budgets to estimate sources and exports rates of mercury-contaminated material. Net in-channel erosion or deposition was estimated by summing all inputs and exports and comparing the result to measured values at the Rumsey and Yolo gauging sites. *Note: Methylmercury data are not available for any of the ungauged tributaries or for atmospheric deposition.*
METHOD FOR DETERMINING ALLOWABLE LOAD (LOADING CAPACITY)	Staff calculated an aqueous concentration of methylmercury that corresponds to the numeric target for TL4 and TL3 fish based on statistically significant relationships of site-specific data on methylmercury in water and benthic invertebrates and large fish.
REDUCTIONS NEEDED TO REACH TARGET	*Note: Reductions were calculated for all tributaries. Below are only a few of those reduction needed.* <u>Aqueous Methylmercury Reductions (as a percent of existing concentration):</u> **Cache Creek**: 70% reduction (actual reduction in methylmercury concentrations to reach 0.06 ng/L is 50% of existing concentrations). **Bear Creek**: 85% reduction **Harley Gulch**: 84% reduction
ALLOCATIONS	*Note: Load allocations were calculated for all tributaries. Below are only a few of those allocation percentages.* <u>Methylmercury Load Allocation*:</u> **Total average allocations for tributaries:** 54%, or 66 g/yr. **Cache Creek**: 30%, or 11 g/yr. **Bear Creek**: 15%, or 3 g/yr. **Harley Gulch**: 16%, or 0.04 g/yr. * Expressed as a percentage of existing loads, equals 100% minus reductions
MARGIN OF SAFETY	Explicit MOS of 10% of future loads of methylmercury.
SEASONAL VARIABILITY/ NATURAL CONDITIONS	Seasonal variability in total and methylmercury loads was accounted for in the source analysis and load allocations. Average, annual loads of total mercury and methylmercury were estimated using data collected throughout the year to account for the seasonal changes in transport of total mercury and methylmercury and methylmercury production.
REASONABLE ASSURANCE	Not applicable since no point sources exist.

IMPLEMENTATION	A phased implementation approach will be used and is based upon the results of additional studies specified in the monitoring plan. *Phase 1* consists of starting the process for remediation of inactive mercury mines to limit output of mercury and sulfate; collect water and sediment data to determine methylmercury sources in the tributaries; and initiate public outreach activities to inform consumers of the potential risks of consuming unsafe amounts of fish from Cache Creek. Phase 2 involves developing and implementing plans to further reduce loads of methylmercury and inorganic mercury. Options to be evaluated include erosion control, stream bank stabilization, and allowing sediment with low concentrations of mercury to replace or bury contaminated material in the streambed.
MONITORING	Monitoring Plan includes: collecting water and sediment samples from entering sites along Cache and Bear Creeks; additional monitoring of methylmercury and mercury in water, sediment, and biota to determine background levels of Harley Gulch; and monitoring of mercury levels in small fish throughout the Creeks.